Statement	T or F
A solvent like water can dissolve an unlimited amount of solute.	**F**
Immiscible materials are substances that are mutually soluble, like H_2O and CH_3OH.	**F**
Water is a nonpolar molecule and is a good solvent for ionic and polar solutes.	**F**
Temperature increases usually increase the solubility of a solid substance in water.	**T**
Gas solubility in water decreases when the temperature goes up.	**T**
When the pressure of a gas over water is raised, the gas solubility increases.	**T**
A saturated solution can dissolve more solute.	**F**
Polar substances do not dissolve well in water.	**F**
Ionic substances dissolve to form electrically conducting solutions.	**T**
There is no such thing as a "supersaturated" solution.	**F**
According to the solubility graph, ≈79 g $NaNO_3$ will dissolve in 100 mL of water at 10^oC.	**T**
100 mLof KCl solution at 50 ^oC has 10 grams. This solution is unsaturated.	**T**
Hydronium ions are hydrated hydrogen ions.	**T**
For nonelectrolytes, the complete molecule goes into solution.	**T**
The ions in a solution that make up the precipitate are *spectator ions*.	**F**
A nonpolar solvent will dissolve a polar solute.	**F**
Dissociation is the separation of ions that occurs when ionic compounds dissolve in water.	**T**
Stirring the solution will help to increase the rate at which a solid will dissolve in a liquid	**T**
Powdering the solid will help to increase the rate at which a solid will dissolve in a liquid.	**T**
Heating the solvent will help to increase the rate at which a solid will dissolve in a liquid	**T**
Pressure has very little effect on liquid/liquid solutions.	**T**

Pressure has very little effect on solid/liquid solutions.	**T**
Gas/liquid solutions respond very easily to changes in pressure.	**T**
Concentrated means a large amount of solute in the solution	**T**
Solubility is the maximum amount of solute that can dissolve in a given amount of solvent under certain conditions.	**T**
Generally polar solute molecules will dissolve in nonpolar solvents**.**	**F**
An aerosol is a colloid of fine solid particles or liquid droplets in a gas such as clouds.	**T**
Foam is a substance that is formed by trapping pockets of gas in a liquid or solid.	**T**
A beam of light or laser light will not trace a visible path through a true solution	**T**
A general rule applied to solute-solvent relationships goes like this: " Like dissolves like"	**T**
Water is the universal solvent.	**T**
The solubility of a gas increases as the temperature of the solvent increases.	**F**
Temperature has no affect on solubility in liquid/liquid solutions.	**T**
When a solute is dissolved into a solvent, the boiling point of the solvent is raised.	**T**
Bp and fp changes are directly proportional to the molal concentration.	**T**
The addition of a solute in water will lower the freezing point below 0^{o}	**T**

Problems:

1. How many grams of NaCl will dissolve in 300 mL of water at 45 ^{o}C?

$$\frac{38\text{ g}}{100\text{ mL}} = \frac{x\text{ g}}{300\text{ mL}} \qquad \text{x=114 g}$$

2. How many grams of CsCl will precipitate out of solution if the solution is cooled from 35^{o}C to 10^{o}C? **more than 20 grams.**
3. What is the molality of a solution that has 7 moles of KCl in 2100 g of water?

$$m = \frac{7\text{ mol}}{2.1\text{ kg}} = 3.3\text{ m}$$

4. How many grams of NaOH are needed to make a 1.7 m solution with 1600 grams of water?

$$1.7\text{ m} = \frac{\left(\frac{x\text{ g}}{40\text{ g}}\right)}{1.6\text{ kg}} = 108.8\text{ g}$$

5. What is the molarity of a solution that has 7 moles of LiCl in 3600 mL of solution?

$$M = \frac{7\text{ mol}}{3.6\text{ L}} = 1.94\text{ M}$$

6. How many grams of KI are needed to make 1400 mL of 1.5 M solution?

$$1.5\text{ M} = \frac{\left(\frac{x\text{ g}}{166\text{ g}}\right)}{1.4\text{ kg}} = 348.6\text{ g KI}$$

7. How many grams of solute are in 1500 grams of a 8.50 % solution?

$$8.50\ \% = \frac{x\text{ g}}{1500\text{ g}} \times 100\% = 127.5\text{ g}$$

8. What is the boiling point of a 0.67 molal solution of H_3PO_4?

$$\Delta T_b = (0.67\text{ m})\left(\frac{0.521^{\circ}\text{C}}{1\text{ m}}\right)(4) = 1.4\text{ C}^{\circ} \qquad \text{new bp} = 100.0\ ^{\circ}\text{C} + 1.4\text{ C}^{\circ} = 101.4\ ^{\circ}\text{C}$$

9. Calculate the molecular weight of butyl alcohol, 18.5 grams of which dissolves in 750 grams of water to produce a solution having a freezing point of -0.62 °C

$$0.62^{\circ}\text{C} = \left(\frac{\left(\frac{18.5\text{ g}}{x\text{ g}}\right)}{.75\text{ kg}}\right)\left(\frac{1.86\ ^{\circ}\text{C}}{1\text{ m}}\right)(1) \qquad 0.33\text{ m} = \left(\frac{\left(\frac{18.5\text{ g}}{x\text{ g}}\right)}{.75\text{ kg}}\right)$$

$$0.25\text{ mol} = \frac{18.5\text{ g}}{x\text{ g}} \qquad x\text{ g} = \frac{18.5\text{ g}}{0.25} = 74\,\text{g/mol}$$